new ones far in front of them; it is also running ahead of the small waves behind it and leaving them to die away. The average velocity of the whole group of waves is therefore smaller than the velocity of the central or principal wave. This is true of gravity waves on the surface of the water no matter whether they start by a sudden impulse as an ocean earthquake wave or are maintained by the wind as an ordinary storm wave. The ordinary earthquake wave is not a gravity wave but one of compression and dilatation, or an elastic wave passing through a medium that is not homogeneous but has in general three axes of elasticity, and therefore behaves in a manner analogous to the action of many crystals on a beam of light.

With regard to the storm waves, a committee of the British Association for the Advancement of Science, of which Dr. Vaughn Cornish is secretary, publishes the following paragraph, on page 313 of the report for 1903:

ON THE SIZE OF WAVES AS RELATED TO THE RATE OF ADVANCE OF A CYCLONE.

The greatest waves will be developed in that part of the cyclone in which the direction of the wind coincides with the direction of advance of the cyclone, and I wish to call attention to the fact that, along this line of action, of all the waves which the velocity of the wind is capable of increasing, that length will enjoy superior opportunities for growth *whose group velocity is equal to the rate of advance of the cyclone*, the storm either outrunning or lagging behind the transmission of energy in waves of any other length. The velocity of the group in deep water is half the velocity of the individual waves.

It was pointed out in the last report that the period of the longest recorded swells corresponds to a wave velocity about equal to that of the greatest recorded hourly velocity of the wind (the velocity of the dominant wave in storms being much lower).

It may be added that no records of swells have been met with having periods approaching those appropriate to a deep sea velocity equal to that attained during the gusts of a storm.

Mathematical investigations have pointed to a tendency of the wind finally to produce steep waves of velocity equal, or almost equal, to that of the wind. When, however, we come to compare the observed velocities of wind, the observed dimensions of cyclonic storms, and the lengths of waves of velocity equal, or nearly equal, to that of the strongest winds, we find that we rapidly approach a condition of things when the stretch of water subject at any one time to such wind is only a small multiple of the wave length; a condition in which steep waves could not be maintained.

DIURNAL VARIATION OF ATMOSPHERIC HUMIDITY.

It is so rare that observers have the patience to make frequent observations of dew-point, relative humidity, or vapor tension, and it is so difficult to maintain correct self-registering apparatus for this important fundamental datum, that our knowledge of the diurnal variation of atmospheric vapor is far less satisfactory than our knowledge of the variations of pressure and temperature. We may therefore call attention to two series of observations, the results of which are published in the Annuaire of the Meteorological Society of France for April and May, 1905. The first series is that made by Dechevrens on the island of Jersey, where the diurnal variasion apparently differs decidedly from that observed at most other maritime or littoral stations. With reference to this series Angot says that at Paris the vapor tension has in January only a single diurnal maximum and minimum, while in July it has a double diurnal oscillation, and he adds that this double diurnal oscillation in the summer time belongs to relatively low stations, where the diurnal variation of temperature is quite large; but at sea and in the neighborhood of coasts and on the summits of mountains we find at all seasons of the year only a single oscillation like that of the winter season at Paris, having only a single minimum and a single maximum. Dechevrens states that the island of Jersey is an exception to this rule at all seasons of the year. Eight observations daily of the tension of aqueous vapor made during the two months January and July, during the ten years 1894–1903, gave him the following values of the hourly departures from the general average of the respective months, which were 5.667 for January and 11.004 for July.

TABLE 1.—*Diurnal periodicity of vapor pressure at Jersey.*

Hour.	January.	July.	Hour.	January.	July.
	mm.	*mm.*		*mm.*	*mm.*
Midnight	+0.027	+0.068	Noon	−0.002	+0.006
1 a. m	+0.018	−0.014	1 p. m	−0.020	−0.026
2 a. m	+0.005	−0.069	2 p. m	−0.007	−0.094
3 a. m	+0.004	−0.121	3 p. m	+0.014	−0.145
4 a. m	−0.012	−0.105	4 p. m	+0.035	−0.169
5 a. m	−0.028	−0.049	5 p. m	+0.023	−0.149
6 a. m	−0.039	+0.062	6 p. m	+0.003	−0.072
7 a. m	−0.037	+0.116	7 p. m	−0.023	+0.008
8 a. m	−0.014	+0.139	8 p. m	−0.023	+0.061
9 a. m	+0.010	+0.104	9 p. m	−0.009	+0.100
10 a. m	+0.028	+0.061	10 p. m	+0.014	+0.118
11 a. m	+0.019	+0.053	11 p. m	+0.026	+0.118

In the Annuaire for May, 1905, M. Th. Moureaux gives a summary of the observations of atmospheric moisture at the observatory at Parc St. Maur during the 30 years, 1874–1903. From his tables we quote the following general results as to the secular variations and the annual and diurnal periodicities:

TABLE 2.—*Annual mean values of atmospheric moisture at Parc St. Maur.*

Year.	Relative humidity.	Vapor pressure.	Year.	Relative humidity.	Vapor pressure.
	Per cent.	*mm.*		*Per cent.*	*mm.*
1874	78.1	7.49	1890	78.7	7.31
1875	79.3	7.72	1891	79.1	7.41
1876	78.8	7.75	1892	76.2	7.26
1877	80.8	7.85	1893	74.4	7.38
1878	82.3	7.96	1894	77.9	7.60
1879	84.2	7.47	1895	77.1	7.42
1880	78.6	7.76	1896	78.3	7.31
1881	78.7	7.37	1897	80.0	7.96
1882	81.2	7.69	1898	79.8	7.88
1883	79.2	7.46	1899	74.8	7.49
1884	79.1	7.70	1900	75.6	7.63
1885	77.2	7.13	1901	75.8	7.22
1886	79.4	7.86	1902	78.8	7.44
1887	78.8	6.97	1903	77.9	7.52
1888	80.7	7.26			
1889	79.9	7.47	Mean	78.7	7.53

TABLE 3.—*Normal annual periodicity of moisture at Parc St. Maur.*

Month.	Relative humidity.	Vapor pressure.	Month.	Relative humidity.	Vapor pressure.
	Per cent.	*mm.*		*Per cent.*	*mm.*
January	87.2	4.90	August	74.3	10.97
February	82.7	5.07	September	80.5	10.04
March	74.8	5.30	October	85.2	7.83
April	69.1	6.11	November	86.8	6.32
May	69.9	7.64	December	88.6	5.12
June	72.7	10.03			
July	72.5	10.97	Year	78.7	7.53

TABLE 4.—*Diurnal periodicity of moisture as shown by the average departures from the annual mean at Parc St. Maur.*

Hour.	Relative humidity.	Vapor pressure.	Hour.	Relative humidity.	Vapor pressure.
	Per cent.	*mm.*		*Per cent.*	*mm.*
1 a. m	+10.0	− 0.06	1 p. m	−15.0	+ 0.02
2 a. m	+11.0	− 0.12	2 p. m	−16.0	− 0.02
3 a. m	+11.8	− 0.19	3 p. m	−15.7	− 0.06
4 a. m	+12.5	− 0.26	4 p. m	−14.0	− 0.04
5 a. m	+12.6	− 0.28	5 p. m	−10.9	0.00
6 a. m	+11.3	− 0.22	6 p. m	− 6.9	+ 0.09
7 a. m	+ 8.6	− 0.09	7 p. m	− 2.5	+ 0.19
8 a. m	+ 4.5	+ 0.04	8 p. m	+ 1.1	+ 0.20
9 a. m	− 9.5	+ 0.13	9 p. m	+ 3.7	+ 0.17
10 a. m	− 5.4	+ 0.15	10 p. m	+ 5.8	+ 0.11
11 a. m	− 9.5	+ 0.11	11 p. m	+ 7.4	+ 0.06
Noon	−12.8	+ 0.06	Midnight	+ 8.9	0.00

In addition to the elaborate tables, of which we have given only the monthly means, Moureaux gives some very interesting data relative to the extreme values. Thus the relative humidity was as low as 8 per cent on the 27th of March, 1899; 10 per cent on March 30, 1893; 11 per cent on April 1, 1892, April 24, 1893, April 2, 1894, and April 14, 1898; 12 per cent on August 18, 1892, February 26 and 27, 1899, and April 21, 1901.

It is evident, therefore, that very low relative humidities occur principally in April and occasionally in February and March. Saturated air occurs mostly in the cold season, with a maximum of 28 days during December, 1879. The monthly means of relative humidity attain their maximum, 84.2, in 1879 and the minimum, 74.4, in 1893. The maximum humidity occurs in December and diminishes continually until April. The year 1879 was remarkable as having seven months during which the humidity was the maximum on record. The lowest monthly mean was 51.6 during the great drought of April, 1893.

THE GUANGO, OR RAIN TREE.

Mr. Fred. Turner, Fellow of the Linnean Society, communicates to the Daily Telegraph, Sydney, N. S. W., of May 27, a short article on the rain tree, or guango, of Australia. He says that during the past 30 years few trees have received more attention than this from both scientific and practical men. At one time and another, writers have recommended its extensive cultivation in the drier parts of the world in order to provide moisture and make the desert blossom as the rose. Its botanical name is *Pithecolobium saman*, Benth.; it is indigenous to Brazil and Central America, but is now raised successfully in many other regions, and is a beautiful umbrageous tree of remarkably quick growth. Mr. Turner states that he has raised more than 300 seedlings in the Botanic Gardens of Brisbane, Queensland. As the latitude of Brisbane is about 27° 30′ S., on the northeast coast of Australia, it would seem, at first thought, as though this tree would flourish in the analogous climates that we have on the southeast coast of the United States, especially the coasts of Georgia, Florida, and Texas, but Mr. David Fairchild, of the Bureau of Plant Industry, states that several experiments at introduction have not met with decided success. Turner states that he has planted the guango in various soils and situations and they made remarkable growth during the summer months, especially after the January rains, but the leaves fell off at the approach of winter and the plants died down to within two inches of the ground. Southern Queensland was too cold, but northern Queensland, corresponding to our Florida, was fairly well adapted. The fruit consists of four to eight seeds, embedded in a saccharine pulpy matter very pleasant to the taste; the mature seed pods are largely used as feed for stock. They are of a light brown color, about a quarter of an inch thick, and from six to ten inches long.

Of course the readers of the REVIEW do not need to be told that trees will not provide moisture or bring rain, but on the one hand such trees as the guango may be helpful in draining wet lands, and, on the other hand, the cool, moist air settling down from their leaves during the nighttime may provide a local condition that will make it possible for certain plants to grow in their neighborhood, that would otherwise be killed by the heat and the dry air.

THE WEATHER OF THE MONTH.

By Mr. WM. B. STOCKMAN, Chief, Division of Meteorological Records.

PRESSURE.

The distribution of mean atmospheric pressure is graphically shown on Chart VIII and the average values and departures from normal are shown in Tables I and V.

The mean pressure for the month was high generally east of the Mississippi River, except in the greater part of New England and northern New York, with values ranging from 29.95 to 29.99 inches; it was also high on the north Pacific coast where the values ranged from 29.95 to 30.07 inches, the crest overlying the mouth of the Columbia River. The mean pressure for the month was low over the southern and middle Plateau and the western portions of the southern and middle slope regions, the minimum values, ranging from 29.71 to 29.75 inches, being reported from Arizona and southern Utah.

The mean pressure for the month was above the normal in extreme western Texas and southeastern New Mexico, and, as a rule, along the northern border from Lake Huron westward to the Pacific coast; elsewhere the pressure was below the average. Positive departures ranging from + .05 to + .07 inch occurred in western South Dakota and southeastern Montana; negative departures ranging from — .05 to — .08 inch occurred in southern Florida, west-central Colorado, Utah, and north-central California.

The mean pressure increased from that of May, 1905, in the Mississippi, lower Missouri, and Rio Grande valleys, and the southern slope and north Pacific regions; elsewhere the mean pressure decreased. As a rule the increases were slight, the greatest, + .06 inch, occurring in central Texas, while over eastern Montana, northern Utah, interior California generally, and southwestern Arizona, the decreases ranged from — .05 to — .10 inch.

TEMPERATURE OF THE AIR.

The mean temperature for the month was below normal in New England, Middle Atlantic States, Lake region generally, North Dakota, northern slope and northern Plateau regions, the western portions of the middle and southern Plateau regions, the Pacific districts, along the south Atlantic coast, and extreme southern Florida; elsewhere it was above the normal.

The greatest negative departures ranged from —4.0° to —5.0° and occurred over central New England, western North Dakota, and southwestern Idaho. The greatest positive departures ranged from + 2.0° to + 2.8° and occurred over northwestern Arkansas, western Missouri, southern Kansas, Oklahoma, and southeastern Colorado.

The temperature was 10°, or more, below the normal generally over New England on the 7th, 8th, 20th, 21st, and 27th; over the lower Lake region on the 27th; upper Lake region on the 26th and 27th; over the northern portion of the Missouri Valley on the 18th, 21st, 22d, 24th, 25th, and 26th, and over the central portion on the 27th; northern slope, 16th, 17th, 18th, 23d, 24th, and 25th; North Dakota, 10th, and 15–24th, inclusive; and northern Plateau, 27th. The temperature was 10°, or more, above the normal generally over the lower Lake region on the 18th; upper Mississippi Valley, 4th and 5th; Missouri Valley, 3d, 4th, and 5th; northern slope, 1st, 2d, and 3d; North Dakota, 2d, 3d, and 4th; and middle slope, 3d, 4th, and 5th.

The mean temperature for the month was as low as any June since the establishment of the station at Flagstaff, Ariz., Independence and San Francisco, Cal.; 1° lower than any June recorded at Eastport, Me., and Modena, Utah; and 3° lower at Mount Tamalpais, Cal.

The maximum temperature was as high as any recorded during June at Hatteras, N. C., and the minimum as low as any June recorded at Block Island, R. I., Richmond, Va., and Tampa, Fla., and at Portland, Me., 1° lower than any previous June recorded.

Maximum temperatures of 100°, or higher, were reported from west-central Kentucky, central Missouri, southwestern Kansas, western Oklahoma, northeastern and southwestern New Mexico, west-central Texas, southern and western Arizona, the interior of southern California, north-central Louisiana, and south-central Arkansas.

Freezing temperatures were confined to extreme northern States and the western mountain regions.

The average temperatures for the several geographic districts and the departures from the normal values are shown in the following table: